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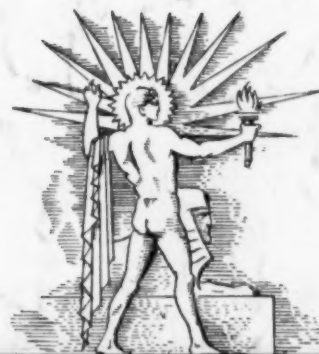
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OCT 16 1941

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



October 11, 1941

Private Industry's First

See Page 238

A SCIENCE SERVICE PUBLICATION

Do You Know?

Calling a man a *skunk* should be a compliment, declare wildlife experts: the skunk yields fur and eats insect pests, besides.

A steel historian says that twelfth century Russian tribesmen in the Ural Mountains wore shoes with *iron soles* an inch thick.

To counteract yellow *sunlight* in a bright room, a little blue added to paint on the opposite wall evens up the walls in color value.

To open new sources of supply of *oil*, Soviet Russia is prospecting for oil wells in the Volga basin, on slopes of the Urals and other regions.

Varied by cross-breeding, the *guppy* tribe of fish includes such interesting members as lacetail, chiffon tail, platinum, rainbow, and many others.

A Soviet chemist not long ago received the Stalin Prize for *glass-making* formulas which speed up the hardening process and make it possible to turn out glass in shorter time.

When you see a U. S. *Army airplane* designated B-26, etc., A is for attack bomber, B for bombardment, C for cargo transport, FM for fighter, O for observation, P for pursuit, T for trainer; the number means the model number; a letter after the number indicates that the original model has been improved; an X preceding the symbol means an experimental model.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

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ZOOLOGY

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A new scientific device for measuring *light* is able to "see" light the way an ordinary human eye sees it.

The European war has caused a serious *tulip bulb* shortage in the United States, and Long Island growers are increasing acreage of tulips.

Using an ice-cream machine with large capacity, a Michigan hospital has successfully tried *freezing* some of the fresh fruits and vegetables it uses.

To reduce night *traffic accidents* in Navaho Indian country, efforts are being made to have Navaho wagons equipped with red reflectors visible 300 yards.

British and German scientific and technical *periodicals* seem to average about half their peacetime size.

Young marble shooters now get their *marbles*, not from Germany and Czechoslovakia, but from West Virginia, which is turning out millions.

Setting a new *plastic* record, one electric refrigerator model has an evaporator frame said to be the largest plastic piece ever injection-molded.

In connection with its engineering defense training program, Purdue University is giving intensive courses in *chemistry* of powder and explosives.

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GENERAL SCIENCE

Scientists See New World Whenever the War Is Won

Cooperation of Scientists in Present War Viewed As Omen of Later Close Collaboration in Peace

WHEN the struggle against Nazism is won, science can build for humanity a new world in which there will be no want and war.

In essence, this is the assurance that representative American scientists sent to the International Conference on Science and the New World Order held in London under the auspices of the British Association for the Advancement of Science.

Conant Sees Cooperation

"SCIENTISTS of Great Britain and the United States are working almost as one group with the purpose of improving instruments of war," President James B. Conant of Harvard, chairman of the National Defense Research Committee, declared in a recorded message. "Is it fantastic to hope that in the not too distant future the scientists of all free countries may be joined in effective action to improve not instruments of war but those of peace? I like to see in the present scientific liaison that runs through the centers of London, Ottawa and Washington a hopeful omen of a long period marked by the friendliest relations between the British Commonwealth of Nations and the United States. If this be so, our work foreshadows a time when professional talent in many diverse societies of free men strive for effective cooperation to the end that we and our children may walk boldly along the paths of liberty and peace."

Einstein Feels Confusion

PROF. Albert Einstein, father of relativity, also sent his recorded voice to the conference.

"The super-national character of scientific concepts and scientific language is due to the fact that they have been set up by the best brains of all countries and all times," Prof. Einstein said. "In solitude and yet in cooperative effort as regards the final effect, they created the spiritual tools for the technical

revolutions which have transformed the life of mankind in the last centuries. Their system of concepts has served as a guide in the bewildering chaos of perceptions so that we learned to grasp general truths from particular observations.

"What hopes and fears does the scientific method imply for mankind? I do not think that this is the right way to put the question. Whatever this tool in the hand of man will produce depends entirely on the nature of the goals alive in this mankind. Once these goals exist, the scientific method furnishes means to realize them. Yet it cannot furnish the very goals. The scientific method itself would not have led anywhere, it would not even have been born without a passionate striving for clear understanding.

"Perfection of means and confusion of

goals seem—in my opinion—to characterize our age. If we desire sincerely and passionately the safety, the welfare and the free development of the talents of all men, we shall not be in want of the means to approach such a state. Even if only a small part of mankind strives for such goals, their superiority will prove itself in the long run."

Peace and Justice Needed

DR. ERNEST O. Lawrence, Nobelist in chemistry of the University of California, wrote:

"At the moment, the greatest human need is peace and justice over the world, and this means that science's greatest immediate task is to implement with ever more powerful and effective weapons the forces for good to fight the forces of evil. To this end scientists almost to a man in this country are bending their efforts. I know that I speak for hundreds of American men of science when I send to our British colleagues heartiest greetings and good wishes along with assurances that we are doing our bit in behalf of the preservation of our common ideals of freedom and justice." (*Turn to next page.*)

DECLARATION OF SCIENTIFIC PRINCIPLES

Presented at International Conference on Science and the New World Order, London

Intellectual freedom is an essential condition of progressive human development. Throughout the ages, individual scientific workers have been forced to fight and to suffer in order that life and intellect may be preserved from the effects of unreasoning prejudice, stagnation and repression. Today they feel compelled to proclaim their special responsibility in the struggle against any subjection which would lead to the betrayal of intellectual liberty.

The war now devastating our world involves an age-old conflict of ideas. Liberal minds of the last generation were convinced that the battle for independence of thought and free expression of opinion was finally won; yet once again this conviction is being violently assailed. The fight to maintain it must perforce be resumed, for the danger of losing the heritage of freedom seems graver than ever before.

During the past third of a century, changes in the conditions of life have come about, more profound than any in human history. Distance has been virtually abolished; cognizance of events has become simultaneous throughout the world; all men have become neighbors. Fresh discoveries open up undreamed-of potentialities for good or for evil, but their proper use demands correspondingly high ethical standards.

While only a century ago the village was an almost self-sufficient unit, today the world is our unit. To such a disturbing change of outlook and obligations, we are not yet attuned, and we must re-adjust our way of living, for only by the fullest and freest adaptation of ideas to new conditions can this re-adjustment be achieved. Intense mental effort and clear vision are now needed.

In the past, freedom for the written and spoken word was desirable; today, complete freedom of thought and interchange of knowledge and opinion are supreme necessities. Full freedom of expression is the very essence of science

as well as democracy: where thought is enslaved science, like democracy, withers and decays. Men of Science must, therefore, declare clearly and emphatically the principles which underlie their beliefs and guide their conduct.

Accordingly, the principles of the Fellowship of science are here affirmed; and it is maintained that any policy or power which deprives men or nations of their free practice convicts its agents of an iniquity against the human race.

1. Liberty to learn, opportunity to teach and power to understand are necessary for the extension of knowledge, and we, as men of science, maintain that they cannot be sacrificed without degradation to human life.

2. Communities depend for their existence, their survival and advancement, on knowledge of themselves and of the properties of things in the world around them.

3. All nations and all classes of society have contributed to the knowledge and utilization of natural resources, and to the understanding of the influence they exercise on human development.

4. The basic principles of science rely on independence combined with co-operation, and are influenced by the progressive needs of humanity.

5. Men of science are among the trustees of each generation's inheritance of natural knowledge. They are bound, therefore, to foster and increase that heritage by faithful guardianship and service to high ideals.

6. All groups of scientific workers are united in the Fellowship of the Commonwealth of Science, which has the world for its province and the discovery of truth as its highest aim.

7. The pursuit of scientific inquiry demands complete intellectual freedom and unrestricted international exchange of knowledge; and it can only flourish through the unfettered development of civilized life.

Urey Sees Plenty

"IN A GENERATION or two men will learn to live successfully with the new abundance that this century has produced," Dr. Harold C. Urey, Nobelist of the Columbia University, said in his message.

"In fact, when men in all walks of life learn that plenty is available for all in this modern world, and learn this so thoroughly that it is part of the background of their thoughts, these wars and uncertainties of life will disappear and the dreams of scientists of good for all will become reality."

Predicts Social Laws

"STRIFE and calamity are the bitter fruit of ignorance, success and achievement the reward of knowledge," Dr. Frank B. Jewett, president of the National Academy of Sciences, declared. "Mankind in the aggregate is, I suggest, ruled by laws or principles of behavior as immutable as those which guide the performance of the molecules of air he breathes. To be sure, the laws of social behavior have not proved as easy to discern as have those of the material world. Newton, single-handed, was able to envisage and enunciate clearly the law which guides the planets in their courses. Faraday and Maxwell drew a correspondingly clear picture of the domain of electrical phenomena. But the world has still to rear its social Newtons and its political Faradays and Maxwells. Indeed, the task is so complex that one wonders whether these social and political discoverers, when found, may not prove to be groups of able investigators who have banded together to secure the increased power of carefully focussed endeavor—not individual human beings."

World State or Chaos

"AIMLESSNESS, concealed behind rusty slogans, characterizes so much of our current social policy that science and the activities of scientific men are largely turned from world problems to the immediate utilities," Dr. Harlow Shapley, Director of the Harvard College Observatory, declared. "The goals are nearby and not inspiring."

"The sooner it is commonly realized that either a world state or chaos and recession lies ahead, the sooner we can shape a program for scientists that appears constructive and is appropriately dignified. Until then we are merely

skilled mechanics with our eyes on the time clock.

"The blueprinting is, of course, not for scientists alone, and certainly it cannot be left to diplomats assisted by shortsighted economists. The draughtsmen must be advised by anthropologists, social psychologists, men who know the religions of people, as well as the more obvious geographers, agriculturists, and engineers. An aim must be the end of aimlessness.

"Although they must be tempered by expediency, the blueprints should recognize the present small size of the planet,

the futility of presumption of racial superiorities, the futility of striving for restoration of a previous social order, the fact that possibly some good points for the adjusted world order can be obtained from the social philosophies of the totalitarian states, and they should recognize especially that if we strive to model the future on the Anglo-American present we are just setting up another great world sorrow and are not going out to meet the coming world state in the frank and intelligent manner that should become the scientific man."

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ASTRONOMY

Comet Surprises Astronomers By Increase in Brightness

Jump From Eighteenth Magnitude to Thirteenth In Few Weeks Causes It To Be Mistaken for New One

By **LELAND E. CUNNINGHAM**
Harvard College Observatory

THE ASTONISHING comet found in 1927 by Drs. A. Schwassmann and A. A. Wachmann, of the Hamburg Observatory, Bergedorf, Germany, has again attracted the attention of astronomers by its unaccountable behavior. It is the first of three periodic comets found by the same pair of discoverers, and is, therefore, called the first Schwassmann-Wachmann comet.

The orbit is unusual because it is more nearly circular than that of any other comet, and because it lies completely between the orbits of Jupiter and Saturn. The comet never comes within half a billion miles of the sun; and it is apparently tailless. Observed every year since its discovery, its orbit is well determined and its position in the sky can be predicted closely for several years ahead. But its sudden changes in form and in brightness are quite unpredictable, as well as mysterious.

On August 29 of this year Dr. G. Neujmin, of the Simeis Observatory, in the Crimea, discovered a comet of the 13th magnitude. It was the second discovered by him in little more than a month, despite his location so near the battle lines. The telegram announcing his discovery was not received in this country until 12 days later.

Soon it was noticed that the positions and motion of the new comet were

those predicted for the first Schwassmann-Wachmann comet, which Prof. G. Van Biesbroeck, of the Yerkes Observatory, had observed, only a few weeks before, at the 18th magnitude! In this time the distance of the comet from the sun and earth had changed but little, so that this hundred-fold increase in brightness represented a real change in the comet itself.

By September 15 the comet had faded at least two magnitudes, but a photograph taken three days later at the Oak Ridge station of Harvard Observatory showed that it had brightened to the 11th magnitude! In this short interval its brightness had, therefore, increased at least thirty-fold, and its appearance had changed markedly. When faint it appeared as a nebulous patch, but after it had brightened it appeared almost star-like.

Such outbursts have occurred several times before. The original discovery in 1927 occurred during one of them. In 1931 while looking over old photographs Dr. K. Reinmuth found images of a comet on four plates taken in 1902 at the Königstuhl Observatory, Heidelberg, Germany. These were later shown to be images of the first Schwassmann-Wachmann comet. Since 1927 perhaps a dozen outbursts have been observed. It is probable that several more occurred during the times when the comet was not being watched. The cause of these outbursts is not known.

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PHYSIOLOGY

Sex Hormone Unique To Man Discovered By Chemist

Scientists Suspect This Hormone, Estriol, Has Some Special Important Function in Human Beings

THE EXISTENCE of a potent sex hormone which is uniquely characteristic of human beings was reported to the symposium held in connection with the 50th anniversary celebration of the University of Chicago by Dr. Edward A. Doisy, professor of biological chemistry at St. Louis University.

As a creator by chemistry of the rare sex hormones, Dr. Doisy has already synthesized two of the ten or more which are now known.

The sex hormone found only in human beings is known as estriol. It is found to be a vital factor in the normal sex life of women. Although there is no certain knowledge yet, scientists strongly suspect that estriol has some special, important function in human beings. Dr. Doisy said:

"Although the physiological significance of these estrogens (female sex hormones) is baffling, one cannot help wondering whether the estriol which has been found only in human beings may not have some special function in that species."

The profound effect of the sex hormones in men and in women is widely known to medical science. The big mystery to science is what happens to these potent chemicals in the human body. The same is true of the disappearance of injected sex hormones in experimental animals.

Women produce some 4,000 international units of sex hormones daily but this is not nearly as large as it sounds, for the international unit is very small. Actually daily production is only one seventy-thousandth of an ounce. During pregnancy the excretion of sex hormone increases 1,000 fold, Dr. Doisy said, and is indicative of the accelerated sex life during the process of having babies. What intrigues medical science is the possibility of tracking down the mystery of this 1,000-fold increase in hormone production in the human body. One answer might be that the body greatly increases its ability to manufacture, or synthesize, the hormone during pregnancy. Or the answer might be that the production stays the same but that

there is greatly diminished rate of destruction of the hormone by the body. Either condition, or both, might account for the observed facts. Only by continuing research will the answer finally be known.

On the same program, sponsored jointly by the American Association for the Advancement of Science, Dr. Allen T. Kenyon, assistant professor of medicine at the University of Chicago, said that injections of the female sex hormone estradiol will produce the same effects in men as does the male hormone testosterone.

Dr. J. S. L. Browne, lecturer in medicine at McGill University, said that an inadequate formation of progesterone, a female sex hormone, may be responsible

for some still births and is associated with some form of sterility in women. Since progesterone is now available in synthetic form injections of this hormone may now overcome such conditions.

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MEDICINE

Cancer and Fluorescence Of Tear Glands Linked

ULTRAVIOLET rays have shown Yale University School of Medicine investigators a possible connection between a mysterious fluorescence of tear glands and susceptibility to cancer.

Placing the Harderian glands of mice—which correspond to the lacrimal or tear glands of human beings—under a "black light" lamp that produces ultraviolet rays, they found that these organs of cancer-susceptible mice gave off a remarkable red glow. Those from strains of mice resistant to the disease, through generations of breeding, remained colorless.

Dr. Leonell C. Strong, research associate in anatomy, was examining mice for enzyme activity with Frank H. J.



PETRIFIED WORM HOLES

Petrified wood is common enough, but petrified wood with wormholes in it is a great rarity. This specimen was picked up in Ransom County, North Dakota, by Prof. J. A. Munro of North Dakota Agricultural College. The holes, at first taken to be the work of wood-boring beetle larvae, were identified by scientists at the Harvard University biological laboratories as the burrows of boring mollusks, similar to the present-day teredo or shipworm and probably over 100 million years old. The wood therefore must either have drifted down some prehistoric river into the sea, or else have been part of a tree sunk by a submerging coast. The grain and other structures indicate that it came from a tree closely related to the modern redwood.

Figge, associate professor of anatomy at the University of Maryland Medical School and Rockefeller Foundation Fel-

lows at Yale, when they discovered the dramatic fluorescence under ultraviolet light.

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ASTRONOMY

British Astronomer Presents New Theory of Solar System

Planets May Be Born of Triple Star Constantly Picking Up Matter in Space; May Not Be Very Rare

PLANETARY SYSTEMS, like that of the earth and its neighbor world which revolve around the sun, may not be nearly so rare as astronomers have thought!

According to a new theory, just presented to the Royal Astronomical Society in London by Dr. R. A. Lyttleton, of St. John's College, Cambridge University, planets may be born of a triple star which is constantly picking up matter from the cosmic clouds in space.

Not in every triple star, of course, would the components be arranged in exactly the right way to bear a set of planets. However, as many such triplets are known in the sky, there would doubtless be large numbers arranged properly, and this would make the formation of a solar system much more common than with most recent theories. These require the exceedingly rare event of one star passing close by, or even colliding with, another.

During most of the 19th century, the nebular hypothesis was accepted. This taught that a primordial nebula gradually condensed into sun and planets. It had to be given up when it was shown conclusively that the present distribution of energy in the solar system could not possibly have resulted from such a cause.

Then came various forms of the encounter theory. These held that the sun was originally a single star in space by itself. Another star passed close by, perhaps actually grazed the solar surface. As the other star went on, a filament of gas was pulled out of the sun, and this condensed to form the planets. However, difficulties arose with this also, as regards energy distribution.

To overcome these objections, Dr. Lyttleton, while at Princeton University a few years ago, proposed the binary star theory. The sun, according to this, was originally part of a double, or binary, star, two orbs revolving around the center of the pair. He suggested that an-

other star came by, and actually hit one of the pair. As with a billiard ball that hits another, not exactly on center, the invading star bounced off in one direction, the star that was hit in another. Between them, as they separated, was drawn a filament of gas. This, he proposed, remained behind as the two stars went on. It started to revolve around the remaining star, and condensed to form planets.

An objection to this theory was raised by Dr. Lyman Spitzer, then of Harvard College Observatory, now at Yale University. He showed that such a filament of extremely hot gas out in space would dissipate, rather than condense, because the forces of expansion would exceed the gravitational forces that tend to pull it together.

In Dr. Lyttleton's account of his new theory, published in the latest issue of the *Monthly Notices of the Royal Astronomical Society*, which has just reached here, he answers Dr. Spitzer's objections. It is true, he says, that a filament of gas left to itself would behave in such a way. However, in the events envisioned in his theory, the filament would remain for a time between the two separating stars, and their combined gravitational pull would be enough to keep the filament together. By the time they had moved on, the filament would have cooled enough that it could contract by its own gravitation alone.

In the new Lyttleton theory, it is suggested that the sun was originally a rather distant companion of a double star with the two parts very close. As the pair of stars picked up matter from the cosmic clouds in interstellar space, their mass would increase, and the stars would come closer, finally touching, and merging into a single body. But this new star would be highly unstable, and would break again, the two components being thrown apart with such high velocities that they would fly away from the

third star, the sun. As they separated, the filament of gas would form, start revolving around the sun, condensing into planets, as with his earlier theory.

Since "triple systems are by no means rare in space," says Dr. Lyttleton, "the formation of planets by this process may therefore be of very much more frequent occurrence than formation by any mechanism of the encounter type."

In proposing his triple star theory, Dr. Lyttleton does not withdraw his older one, but presents the new as an alternative. "Any theory of the origin of the solar system is necessarily a theory of the past and therefore its initial hypotheses cannot be subjected to any direct experimental test," he writes. "In other words, no decision can be made as to whether or not, given a consistent theory of the origin of the solar system, our planetary system came into existence in the manner described by the theory; the theory can only show that the system could have been formed in a certain way."

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GENERAL SCIENCE

Stores Science Exhibits To Give Space For Defense

PUTTING in storage "for the duration" the scientific exhibits that have attracted thousands to its monumental building, the National Academy of Sciences has converted its exhibit halls into offices for use of scientists working on national defense.

Dr. Frank B. Jewett, president of the Academy, in announcing this action, explained that two sections of the Office of Scientific Research and Development created by President Roosevelt a few months ago will be housed in the building and that other science defense functions may require space in the near future.

These two sections are the Medical Committee headed by Dr. A. N. Richards and Section A of the National Defense Research Committee headed by Dr. Richard C. Tolman. The work of the National Research Council, a part of the Academy, has also increased due to the defense effort.

Science Service, the institution for the popularization of science, trustees of which are nominated by the Academy, this summer removed its offices which had been in the Academy building for 17 years in order to give more room for defense activities. Science Service is now housed in a building of its own at 1719 N. St., N. W., in Washington.

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PUBLIC HEALTH

Report Typhus Vaccine Trial Going Forward on Large Scale

**Health Officials Vaccinate 3,600 Indians in
Bolivian Highlands Who Live With Untreated Others**

FIRST large scale trials under satisfactory conditions of anti-typhus fever vaccine are now under way in the highlands of Bolivia.

Dr. R. E. Dyer, assistant director of the U. S. Public Health Service's National Institute of Health, has just returned to Washington from a medical expedition to that area.

With his colleague, Dr. N. H. Topping, who is still en route from La Paz, Dr. Dyer vaccinated about 3,600 Indians over 10 years of age living in the Bolivian highlands where typhus fever occurs every year during the rainy season, frequently flaring into disastrous epidemics.

"We split the families in the middle," Dr. Dyer stated, explaining that in this way each vaccinated person is matched by an unvaccinated person living under exactly the same conditions in the same house and even sleeping in the same bed and thus equally exposed to louse-borne typhus fever germs.

Every two weeks a Bolivian doctor

now visits each family. If he finds any typhus fever patients, he will take a sample of the patient's blood and send it to the National Institute of Health in Washington. Two weeks later he will take another sample of the patient's blood or, if the patient has died, he will collect a sample of blood from his spleen and send that to the Institute for examination.

In this way, the Public Health Service expects to learn, within the next six months, the exact value of this vaccine which, if successful, may be sent to England for British troops on duty in typhus fever regions of Europe and may also be used for American troops if hemisphere defense takes them to typhus fever regions in South America.

The vaccine was prepared by the method originated by Dr. Herald R. Cox, of the National Institute of Health. Previous attempts to learn its value from trials in typhus fever regions of central Europe failed because of war conditions.

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bony growths which projected into the canals connecting the vertebrae in the spine. These bony obstructions usually occurred between the fifth and sixth and sixth and seventh cervical vertebrae, near the large bone projecting at the back of the neck, limiting the space allowed for passage of spinal cord and nerves. This resulted in the crippling pain to neck and arm and often affected chest muscles.

Heat applied over the affected neck vertebra, with massage, traction and manipulation relieved the majority of patients of pain.

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● RADIO

Thursday, October 16, 3:45 p.m., EST

On "Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. John L. Rice, Commissioner of Health of the City of New York will tell of the highlights of the convention of the American Public Health Association.

Listen in each Thursday.

Monday, October 20, 9:30 p.m., EST

Science Clubs of America program over WRUL, Boston, on 6.04 and 11.73 megacycles.

One in a series of regular periods over this short wave station to serve science clubs, particularly in high schools, throughout the Americas. Have your science group listen in at this time.

MEDICINE

New Cause and Relief for Arthritic Pain Discovered

**X-Ray Pictures Show Bony Growths Which Project
Into Canals in Vertebrae in the Spinal Column**

RELIEF for the arthritic stiffness and soreness that plagues many men and women past 40 years of age can be given by treatment directed toward a newly discovered cause of the condition, Dr. Charles S. Capp and Dr. Stacy R. Mettier, of the University of California Medical School, report.

Pain and muscular stiffness of neck and shoulder that make it impossible for the patient to comb his own hair, reach behind his own back, or that even prevent the use of hands in fine movements such as sewing or writing,

were formerly laid to two causes: an injury or pressure of a rib on the brachial plexus, a great nerve in the neck; or a cancerous or bacterial attack that destroys neck vertebrae.

But, doctors found, many patients past their fortieth birthday suffered the symptoms when these causes were not present. Some physicians put the blame in such cases on an inflammation of a spinal nerve.

Dr. Capp and Dr. Mettier, using a new method of diagnosis, found that X-ray pictures of 30 patients showed



TREE-SIZE TOBACCO

This tobacco growing in a California garden is of a giant kind obtained from an island off the South American Chilean coast. Elsewhere, it is believed to have been extinct for millions of years. These plants were cut back to about five feet, or less, in the winter of 1938. (See SNL, Sept. 20)

AERONAUTICS

Why Does An Airplane Fly?

These Experiments Will Show You How and Why

By JOSEPH H. KRAUS
Science Clubs of America Editor

THE ANSWER to this question may puzzle those who have not studied the subject. They know, for example, that the average block of wood floats in water, while a similar block of steel would sink. The wood floats because it is lighter than the quantity of water it displaces. However, if the block of steel were rolled thin and made into a can, or a boat, it would float also. Now it has become lighter than the weight of water it displaces. Similarly, a balloon rises in the air because the weight of the balloon and the gas it contains is lighter than the surrounding atmosphere. That is why it is called a lighter-than-air craft.

But an airplane is heavier than air. What then is the basis for its remaining aloft?

Scientists have established that two-thirds of the lift of an airplane's wings is produced by a partial vacuum created above the wings, the other third of the lift results from air pressure under the wings. Demonstrations to illustrate the action frequently are given in well-equipped laboratories.

Nevertheless, with only the simplest of materials, we can demonstrate some of the physical laws which apply to aerodynamics (that branch of science which treats of the laws of motion of gases and the mechanical effects they produce).

Whenever a stream of liquid, or gas, is caused to move rapidly it produces a low pressure area—a so-called "partial vacuum"—around it. This is known as the Bernoulli effect.

We can see this principle applied in a practical fashion by examining the ordinary fly-and-paint-sprayers; or by making a sprayer of our own. For this we will need a corner of a cardboard box, a short length of Scotch or adhesive tape and an ordinary drinking straw.

With a sharp knife cut the straw in half, then cut off the corner from a two-inch square of cardboard. Attach the two straws to the edges of cardboard as shown in the diagram at 1. An air gap of about a sixteenth of an inch should separate the straws at the corner. The vertical straw should be so positioned that the top is at the midpoint of the horizontal straw.

Now dip the vertical straw into a glass of water and blow into the horizontal straw. When this is done the water is lifted up over the top of the vertical tube where the force of the air breaks it up into very fine particles which issue as a spray.

This experiment demonstrates the formation of an area of diminished pressure—a partial vacuum—produced by a gas, or air, in rapid motion. All fly- and paint-sprayers operate in the same fashion. Instead of blowing through a tube the stream of air is supplied by a pump.

Let us now carry our experiment one step further. About three-eighths of an inch from the edges bend up the two narrow ends of an ordinary visiting card. On the legs thus formed rest the card on a table. (See illustration 2.) Now try to blow it over. You will find that the harder you blow the more firmly will the card seem to cling to the table top. Here again



SCIENCE

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we find that the Bernoulli effect applies. Again the air which has been put into rapid motion produces a partial vacuum. When this happens, the air in the room tends to rush in to fill the low pressure area. However, the card blocks its path, so to speak, with the result that the card is pressed more firmly to the table top. If we use a rather thin card for this demonstration we will find that the top curves downward under influence of the atmospheric pressure. (Air has weight. At sea level and under normal conditions, it presses upon every square inch of surface with a pressure of 14.7 pounds.)

Let us now tear off a strip of paper about eight inches long and about two inches wide. Fold over one end making a tab about a half inch long. Hold this strip against your chin, as is shown at 3, and blow hard. You will find that the paper, instead of being blown away, rises into the air stream. It moves up into the area of reduced pressure. The paper strip thus acts very much like the wing of an airplane and is lifted by the air stream.

It will be seen that in all of the examples given here, the partial vacuum was responsible for the effects obtained; it lifted the column of water in the sprayer, it held the card to the table top and it caused the paper in the last experiment to rise instead of being blown downward as one might suppose should happen.

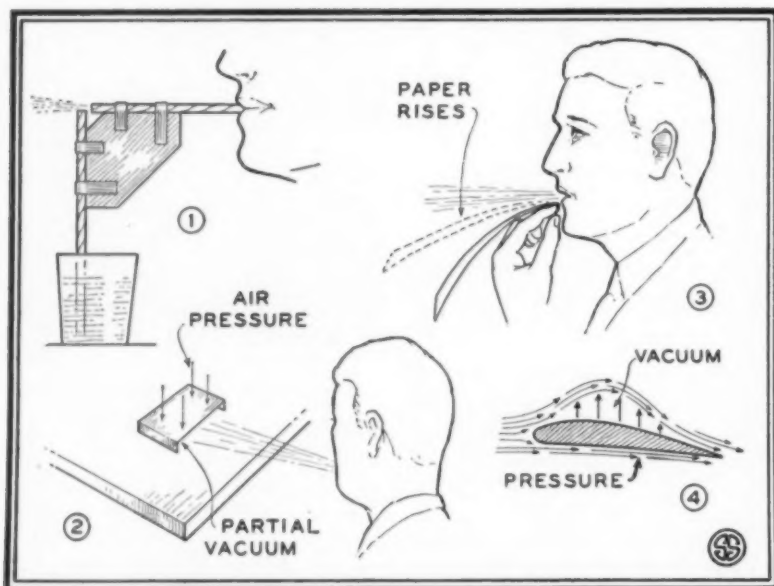
Let us apply the experimental knowledge so obtained to an airplane. In the experiments we have performed we have had a moving column of air. We must now change the order of things. Instead of moving a column of air it is the airplane which must be moved while the air remains more or less stationary. But the end result is the same; that is, the air moves with relation to the wing.

To produce this motion, an airplane uses an engine to drive an air propeller, which "bites" into a quantity of air at each revolution. This causes the airplane to move rapidly along the ground. When sufficient speed has been obtained in this fashion the airplane can take off.

Here again the vacuum created above the wing gives the plane much of its lift; in fact, instruments attached to various parts of the wing structure indicate that two-thirds of the lift is produced by this vacuum, the other third is given by air pressure under the wing.

In our experiments we have learned that a rapidly moving stream produces a partial vacuum and that this vacuum is most important to the lift of an airplane. In fact, without it, the airplane of today could not fly.

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THE OBSERVER



American Sponsored by Science Service

These Pages Service Science Club Movement

This section, under the title of the monthly science clubs publication of the American Institute of the City of New York now absorbed in the SCIENCE NEWS LETTER, is the official organ of Science Clubs of America. Issues of the SCIENCE NEWS LETTER containing such center spreads as this will appear monthly October through May and will be sent to all sponsors and leaders of SCA affiliated science clubs. Other weekly issues of the SCIENCE NEWS LETTER will carry a brief Science Observer section for SCA news and announcements.

Age is now no barrier to participating in science club activities. Any individual or group, interested in science activities, may become affiliated with Science Clubs of America. The affiliation fee for a group is nominal, \$2 a year for 20 members or less, and brings a novel certificate of affiliation, membership cards, valuable service bulletins and other materials useful in club operation. Individuals may become associated with Science Clubs of America for a nominal fee of 25 cents, which includes a free copy of the 128-page Science Handbook for 1942 to be issued about Jan. 1.

Application blanks for club affiliation and further information about Science Clubs of America will be sent on request to Science Service, 1719 N St., N. W., Washington, D. C.

Science News Letter, October 11, 1941

SCIENCE CENTERS

Science Centers, those very essential permanent meeting places where science club members are accustomed to gather, give promise of even greater activity as the new season starts. In addition to Centers that already have from one to three years of experience behind them, and therefore are adept at the conduct of functions for clubs, a great many more Science Centers will be established this year.

This is stimulated by the spread of the science clubs movement in this country and others. It is a most important part of the whole program that every club have at least one opportunity a year to visit a function at a Science Center. There will be no difficulty in achieving this as the success of already existing Centers is becoming well known.

The state of Virginia, where the Junior and Senior Academies of Science are working together to bring science activity within the reach of every interested amateur, has expressed its whole-hearted backing of Science Clubs of America and is proceeding

with plans made at the end of last season. Similar renewal of activity is occurring in Missouri where more than 40 clubs "came alive" in September and began working out scheduled projects in their program.

In Middletown, New York, the very successful science fairs will be continued under a new director in the same Center. Farther north in the state, Rochester eased back into its Center activities with a gala "Hot Dog and Corn Roast" for all members in that area. The October 13 short wave broadcast from station WRUL (6.04-11.73 megacycles) at 9:30 p.m. (EST) will bring you greetings from this energetic Center.

An established Center at Baltimore, Maryland, has influenced the start of a neighboring one at Wilmington, Delaware. Big things are planned for the whole state of Ohio where a number of cities are ready to pop up almost simultaneously with new Centers. A Massachusetts manufacturer offers the use of the laboratories for skilled science club members in the community and another company is looking favorably upon a similar plan.

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NEWS OF CLUBS

The national science club program proved so valuable that geographic lines separating nations could not confine it. The result was that clubs in Puerto Rico, British West Indies and Canada soon found much of value in their affiliated memberships.

Now the science club movement reaches out across the sea and we welcome the first club from Europe, located at Lisbon, Portugal. This group, known as the *Centro Portuguez de Divulgacao Cientifica*, is under the sponsorship of Professor Antonio Crespo Viana.

The banding of migratory birds for the Government is of prime concern to the *St. Francis High School Science Club*, Clearfield, Pa.

*Sister Mary Esther, Science Teacher.

Individual projects and field trips occupy the attention of the *Monmouth (Ill.) High School Science Club*.

*Mr. Joseph D. Dixon, Teacher.

The *Laboratory Detectives* is the name of a club specializing in laboratory projects at the Sacred Heart Academy, Tampa, Fla.

*Sister M. Lucy Josephine, Science Instructor.

For six years the *Bi-Phy-Chem Club* of Sharon Hill High School, Sharon Hill, Pa., has been actively engaged in pursuit of science projects, the subject matter of which is cleverly featured in its name.

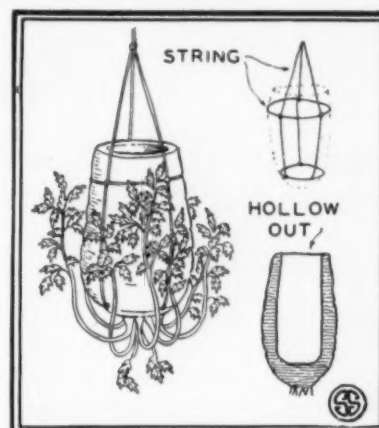
*George F. Stauffer, Head of Science Department.

Scientific experiments will occupy most of the attention of the *Bedford High Science Club*, Bedford, Va.

*Miss E. Deane Saunders, Teacher of Math, Bio and General Science.

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*Indicates sponsor.



BOTANY

Fine Decorative Effect Given by Humble Carrot

EVERYONE DELIGHTS in having a growing green plant in the home, particularly if that plant is somewhat unusual.

An interesting decoration for the home is a growing carrot. Its green lacy leaves sweeping upward around the root gives this ornament a touch of individuality.

The preparation is very simple. Cut a large and rather fresh carrot in half. With an apple corer, potato peeler or knife, scoop out the interior of the top half of the carrot to within about a half inch of the crown, leaving a wall thickness of about a quarter of an inch.

With thin string make a saddle in which to rest the half root and hang it in the window. Keep the carrot filled with water and in a few weeks the leaves will emerge. Remember that as the leaves grow the carrot body will have to be filled with water more often. The plant will continue to grow for several months, during which time it will require no other attention.

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Each Monday evening, 9:30 p.m. EST, on two frequencies (6.04 and 11.73 megacycles) Station WRUL of the World Wide Broadcasting Foundation, Boston, Mass. will present a SCA program. This is your program. Send in news of your club. Prepare transcriptions five minutes in length for broadcasting during this period. Hold a meeting around a short wave radio each Monday evening.



SCIENCE CLUBS OF AMERICA

* SCA, under Science Service sponsorship, continues the pioneering activities of the American Institute of City of New York over the past 15 years and the Student Science Clubs of America which was merged with that movement. The American Institute continues to foster the regional activities of the junior clubs of the New York City area as a science center.

To effect close cooperation between the American Institute and Science Service, an advisory committee on SCA is being formed.

The principal SCA staff consists of Joseph H. Kraus, SCA editor, and Margaret E. Patterson, SCA membership secretary, based at New York in offices at 310 Fifth Avenue, also occupied by the American Institute, H. D. Lufkin in charge, and its Science Laboratory, Henry Platt directing.

CONSERVATION

You Can Save Fuel

National Defense Will Be Aided If You Follow Suggestions of Engineers for Saving Heat in Your Home

By WEBB WALDRON

HOW MUCH money you may save through improving the efficiency of your heating plant is shown by the experience of 7500 Baltimore families who use oil burners. Last year, their oil dealer consulted government experts and ascertained that with a highly efficient heater (either oil or coal) the chimney flue would not get hotter than 600° and the carbon dioxide content in the flue would be 10 per cent.

The dealer's service men went over every customer's furnace, adjusted the oil burner, regulated draft, repaired leaks, cleaned the boiler. They could not get every chimney to test up to the government ideal—particularly where coal furnaces had been converted to burn oil. But the 7500 families were comfortable with 1,400,000 fewer gallons of fuel oil last winter. One family saved 32 per cent on its oil bill and the average saving was \$18.75.

Now the Baltimore idea is being applied on a wider scale. There are 1,260,000 families east of the Alleghenies burning too much fuel oil, experts assert; if cleaning, repairs and adjustments could bring the carbon dioxide in these chimneys even up to 8 per cent, it would save enough fuel oil to release ten tankers to Britain.

The 2000 oil burner dealers in the East have been vigorously pushing a "War on Waste." They offer analysis and check-up for \$3 to \$5; every oil-using household should have it done. I know one Connecticut family which cut its oil bill 20 per cent by this means last year.

Coal Efficiency Up to You

If you burn oil or gas, you are in the hands of your service man, but if you fire a coal furnace, efficiency is up to you.

A thin fire wastes fuel. The deeper the fuel bed the better the combustion, and the less coal used. The less a coal fire is disturbed, the better. Never poke an anthracite fire from the top. At night, shake the grates gently till the ash-pit shows a glow, then fill the fire pot. One great fault of average householders is

that in the morning they open up the furnace and fire it all at once. The house in an hour or so may jump from 60° to 80°. If you do that, you're wasting coal. Add a thin layer of coal in the morning, and after the fire has started up, fill the fire pot. Later on, when the fire is vigorously burning and checked, the grates may be gently shaken, cleaning the fire of ash.

If you use bituminous coal, never cover the entire bed of fire with fresh fuel. Leave a spot uncovered to ignite the gasses driven off from the new coal. If these gasses go up the flue unburned, you're losing a lot of heat.

Draft Is Important

Draft is important. With too little oxygen, the coal can't burn completely, yet too much air cools the gasses so that they will escape before they're burned and you'll have smoke instead of heat. Smoke is always proof of waste; the householder who runs a smokeless fire saves money for himself and helps keep his town clean.

Coke needs a larger fire-box than coal so that it will not burn out too quickly. Be chary of shaking coke.

Few householders are careful enough in handling draft and damper. In most cases, it would be economical to put in a thermostat control, at a cost of \$25 or so.

Experts all agree that sifting your ashes is unnecessary. If you're getting much unburned coal in the ashpit you're using too thin a fire or shaking the fire too much, or your grates are broken, or you're buying coal too small for the grates so it drops through unburned, or too large, so it doesn't burn completely. With egg coal, in a thin fuel bed or a small fire-box, a heart of green coal is often left inside pieces that look like ash. Stove coal is the best size of anthracite for the average furnace. If your plant is properly operated, you will not have over 3 per cent loss of coal in the ash pit, much of it so finely distributed through the ash that you can't reclaim it.

Be sure that your fire-box is tight. Are furnace and pipes well insulated? It isn't too difficult to cover them yourself with asbestos.

Is boiler water clean? Even the best gets rusty from the pipes; perhaps your local water is high in iron, lime or other minerals. Scum impedes the water from breaking into steam. Minerals crust the boiler pipes. Have your boiler flushed out each season, and its pipes cleaned. A 1/32 inch of fly-ash on the heating surface of the boiler loses you 10 per cent of your fuel.

One-eighth inch of soot is as much insulation between fire and boiler water as two inches of concrete. See that the inside of your furnace is well cleaned with a vacuum cleaner and wire brushes. Keep your chimney clean. A dirty chimney hinders draft and is a fire hazard.

Sometimes the steam pressure in one-pipe systems seems unable to push the slug of cold inert air out of certain radiators, so that they stay cold. Fast-venting valves should be installed.

With a warm air system, be sure your dust filters are clean. New filters are inexpensive. Dirty ones impede heat circulation.

Does it pay to push the thermostat down at night? Engineers have violently opposed opinions. Some insist the fuel saved at night is all used warming the house again in the morning. However, in careful tests at the University of Illinois, shifting the thermostat from 72° to 60° between 10 p.m. and 4:30 a.m. saved fuel—from 7 per cent to 11 per cent, depending on the weather. Just how much *you* save will depend partly on your house. A well-insulated house with storm windows and weather-stripping will cool very slowly after the thermostat is set lower, and will warm quickly in the morning.

Place on Inside Wall

Location of the thermostat is important. It is best placed on an inside wall, away from fireplace, chimney or radiator, likewise away from outer doors.

Old-type thermostats that lag four or five degrees waste fuel. The newer type holds heat within one degree of where you set it, saving fuel.

Extravagant statements have been made about the value of humidification. It has been said that if a home was properly humidified 68° or even 65° was comfortable, thus saving a good deal of fuel. Humid air feels warmer than dry air at the same temperature, but the Na-

tional Bureau of Standards states that the amount of fuel required to evaporate water to obtain a feeling of warmth is probably greater than that required to achieve the same results by maintaining a slightly higher temperature.

Moreover, the American Society of Heating and Ventilating Engineers states that all tests as to the bad effects of dry air on health have been negative or indecisive.

See that your fireplaces have dampers. Otherwise tremendous quantities of heat flit up their chimneys.

Will you save heat by cutting off an unused room? If it's an isolated room, you certainly will, but if it is surrounded by heated rooms, you don't. You'll simply be heating it inefficiently—i. e., expensively—through walls and floor. Sometimes housewives, distressed by

ugly steam radiators, hide them with pretty covers. They might as well put the radiators in a clothes closet and shut the door.

Keeping a house at much above 70° is expensive. In the latitude of Washington, D. C., it takes one-fifth more fuel to hold a house at 75° than at 70°.

Free circulation of air from room to room is important in conserving fuel, especially with hot air systems. It is almost impossible to heat a cold room unless its doors are open to the other parts of the house, so that circulation is set up in the room.

If you follow such of these suggestions as apply to your home, you'll be doing your part in conserving fuel for national defense, with no sacrifice of comfort or danger to health.

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ASTRONOMY

Stars Have Atmospheric Shells Like the Sun's Corona

Two Groups of Extended Atmosphere Described; One At Rest on Star, the Other Expanding Rapidly

THE ATMOSPHERES of the distant stars may have regions similar to those of our sun, which itself is a star.

Dr. Otto Struve, director of Yerkes Observatory, uses the terms "reversing layers," "chromosphere," and "corona," in describing the outer portions of stars which appear to have shells of gas surrounding them, although their atmospheres are probably not exactly the same as the sun's.

The picture of a star as a spherical mass of gas with an opaque surface radiating most of its light is no longer one which tells the whole story. During the past two years, Dr. P. Swings and Dr. Struve have secured a large number of peculiar stellar spectra at the new McDonald Observatory in Texas. These, and observations from Mt. Wilson and Victoria, formed the basis for Dr. Struve's recent discussion before the American Astronomical Society.

There are two groups of extended atmospheres. The first kind remain at rest with respect to the star itself, while the second expand, with more or less rapid motion. Novae, or new stars, are characterized by expanding shells which are eventually observed visually as well as spectroscopically, and appear to form what are called "planetary" nebulae.

Dr. Struve advances the hypothesis that fundamentally all stars which exhibit shells are alike, and that the tendency of a star to produce a shell results either from rapid rotation of the reversing layer (portion of its atmosphere which produces the dark lines in the star's spectrum) or from a tendency of the star to become double. This latter case is observed in the star Beta

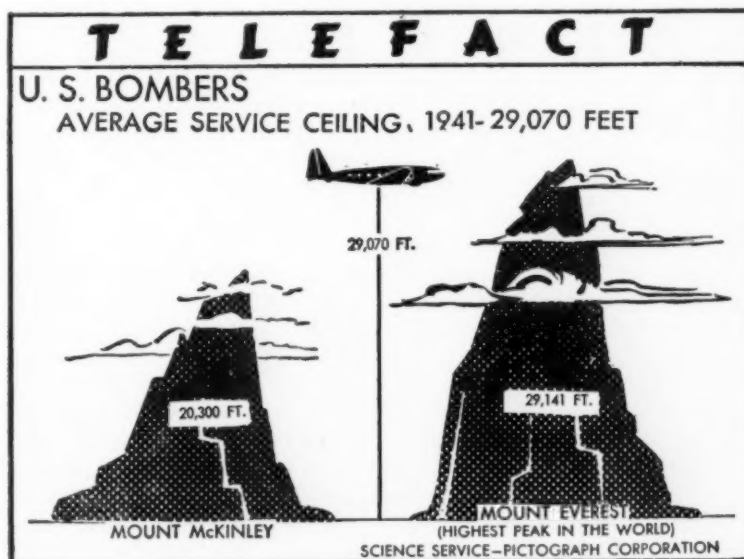
Lyrae, which is shaped like an hour glass, and has a tail of matter streaming from it and forming a shell around it.

In stars with shells, three layers are distinguished. The first is the stationary reversing layer, but it is in rapid rotation; then comes an inner stationary shell which shows little or no rotation, and which Dr. Struve calls the chromosphere; finally the outer, expanding shell, which he calls the corona. In some stars the outer shells are one or the other or both opaque, while in others they are transparent, and these differences produce important observed differences in their spectra.

However, Dr. Struve pointed out that there are stars which are known to be in rapid axial rotation, but which show no shell around them. No explanation for this is given at present.

Closely related to Dr. Struve's researches are those of Dr. Paul W. Merrill, of Mt. Wilson Observatory. He classifies the lines observed in a star's spectrum into three groups: "stellar" lines are produced in the reversing layers of the stars themselves; "semi-detached" lines come from extended stellar atmospheres or shells, and from the so-called planetary nebulae; "interstellar" lines originate in clouds of sodium, calcium and other elements in the tremendous spaces between the stars. The interstellar lines are recognized because they do not shift their positions according to the star's motion, as do stellar lines. The semi-detached lines show similar characteristics, but do not increase in intensity with increasing distance of the stars.

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Unlisted Casualties

UNKNOWN, unnoticed casualties of the new war that is tearing Europe to bits are many, especially among the wild creatures that lived in the forest and fields suddenly turned into areas of savage, blasting battle. Until the fighting ceases we shall not know what has happened to them; perhaps we shall never be able to find out.

Among the animals now utterly lost amid the dust and smoke of new battles is one species that was almost exterminated during the first World War. The present conflict may mop up the few survivors. This is the wisent, or European bison, close cousin of the shaggy animals that were the Thundering Herd of our own western plains until half a century ago.

Before the first World War there were about 800 or 900 of these animals in the forest of Bialowies, in Poland. In the time of starvation and anarchy that followed, practically all these animals were killed for food by peasants and straggling soldiers. When the Polish Republic became a stabilized nation and took charge of the area, there were only a handful of wisent left. These were put in a fenced range and carefully protected.

Now, war has swept through the Bialowies woods twice in two years. The forest was in the Soviet-occupied part of Poland when that country was partitioned between the Reich and the USSR in the autumn of 1939. The Soviet government promptly set up a preserve, endeavoring to carry on what the Poles had started. But in the past few weeks they in turn have been driven out by the crushing onrush of the Panzer corps. It is too much to hope that the few surviving wisent escaped.

There used to be an even larger herd in the Caucasus, before the first World War. An expedition of Soviet scientists went into that area about ten years ago. They did not find a single living wisent.

There were also scattered small groups, mainly on large estates and in zoological gardens. Their fate is unknown. Best chances for survival would seem to be for the wisent on the estate of the Duke of Bedford, in England, and for

a small group in Sweden. The latter, however, are said to have been hybridized with American bison, so that as representatives of the original species they hardly count.

So far as judgment is possible at present, one is forced to the melancholy conclusion that here is another once-great animal whose long twilight is passing into the night of final extinction.

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ANTHROPOLOGY

Book on Race Problem Refutes Nazi Doctrines

Book Sponsored By Catholic University of America Is, However, Non-Sectarian Work by Many Authors

NAZI dogmas about race are treated rather roughly in a new book, *Scientific Aspects of the Race Problem*, sponsored by the Catholic University of America. (*Reviewed SNL, this issue*) Although neither Nazism nor Fascism are anywhere mentioned by name in the book, and the word "Aryan" does not occur in its pages, no doubt is left about its purpose.

The aim, indeed, is openly avowed in the preface, written by the University's rector, Bishop Joseph M. Corrigan, who states: "Truth will never be defeated, though it may be obscured for a time. Nevertheless, the only remedy we can hope to apply against the madness which seems to have befallen so large a part of Western civilization is to state clearly the objective truth. Truth indeed will but seldom convert those who have fallen the prey to fanatic creeds; but it may, and it alone may, prevent the spreading of the disastrous contagion. It is timely and necessary, therefore, to treat the question of race in a cool, objective, and truly scientific manner."

Since the Catholic University of America is the property of all the bishops of the United States, rather than of a single religious order or society, a publication of this kind must have been considered very carefully before being undertaken, and it may be assumed that it has the consent and approval of the very highest authority in the Church.

The book, however, is specifically not a sectarian work. Of the six authors who contributed chapters, four are non-Catholics, and neither they nor the two

Catholic authors make the slightest mention of Catholic or any other religious doctrines. The discussion is thoroughly and factually scientific throughout.

The initial chapter, by Dr. H. S. Jennings of the University of California at Los Angeles, is a condensed but complete statement of what is known at present about the facts of heredity and the biological processes underlying them. There follows a closely related chapter, by Prof. Charles A. Berger, S.J., of Fordham University, on human psychological inheritance. Neither Dr. Jennings nor Prof. Berger is willing to make any sweeping statements about heredity in human beings; existing facts simply do not justify such declarations.

Dom Thomas Verner Moore, O.S.B., professor of psychology at the Catholic University, contributes a third chapter, in which he discusses how far animal and human intelligence march together and where they part company. There is evidence, which he brings out, that animals perceive and "reason" somewhat as man does where concrete material things are concerned. But confronted with the simplest abstraction, even dogs and apes apparently are unable to do anything with it. From there on, man walks alone.

Dr. Ales Hrdlicka, veteran anthropologist of the U. S. National Museum, discusses the physical realities of races in his chapter. His tabulations of existing and ancient races show that most peoples of the world are and have been very mixed. Incidentally, Dr. Hrdlicka considers Nordic man to be descended from the Mediterranean stock—an idea that

would hardly please Nazi race "experts".

Prof. Robert H. Lowie of the University of California and Prof. Otto Klineberg of Columbia University, who discuss respectively the achievements of human races and mental testing of racial and national groups, give no comfort to believers in racial superiorities. Their findings, and those of co-workers whom they review, load the scales rather heavily on the side of environmental influences.

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PSYCHOLOGY

Army Seeks New Yardstick To Measure Flyers

THE ARMY is searching for a new kind of yardstick. With it they want to measure the dauntless spirit, keen perception and sure-fire judgment that make the fighting flyer a success.

Three new psychological research centers are being established at Army Air Corps fields where intensive work will be done to find rapid, accurate ways of picking men who will make good pilots, good leaders, good observers or good bombardiers.

Taking up the threads of research where pioneers in this field dropped them at the end of the first World War, psychologists will now seek out new devices and tricks of technique fitted to selection and training of men for modern blitzkrieg warfare in the stratosphere and dive-bombing to the earth.

Psychologists will work closely with physiologists and medical officers in this research because it is recognized how closely interrelated are the problems of mind and body.

The Army has picked to head these psychological research centers, under the medical division of the office of the Chief of Air Corps, men who are recognized as leaders in psychology. Among them are: Dr. John C. Flanagan, of the Cooperative Test Service of the American Council on Education, who will direct the project from Washington; Prof. Robert T. Rock, of Fordham University, who will be at Kelly Field, Texas; Prof. Laurance F. Shaffer, of Carnegie Institute of Technology, at Maxwell Field, Ala.; and Prof. Arthur W. Melton, of the University of Missouri, probably at Santa Ana, Calif. A psychological staff will also work at the School of Aviation Medicine, in the medical research laboratory.

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Old automobiles are being converted into farm tractors in England.

MINERALOGY

New Mineral Discovered With Smallest Crystals

So Small that 1,000 Laid End to End Would Measure Only an Inch, Crystals Have Been Successfully Measured

MINERAL crystals so small that 1000 of them laid end to end would reach only an inch, have been successfully measured by Samuel G. Gordon, mineralogist at the Academy of Natural Sciences of Philadelphia.

These crystals are of a new mineral, just discovered in a mine in Argentina, and flown air mail to the Academy's expert for description and naming. They are the smallest mineral crystals ever measured, the previous smallest being twice as large.

Called sarmientite by Mr. Gordon and Dr. Victorio Angelelli, of the Argentina department of mines and geology, co-author of the paper in which it is described, the new mineral is found in fair-sized nodules of great purity, of a pale yellow-orange color, in iron sulfate deposits of the Santa Elena mine.

This mine, high in the mountains of the department of Barreal, lies between San Juan and Calingasta, at an elevation of around 5,000 feet. It has been worked only a short time, yielding alums for use in water purification.

Already a number of rare minerals have been found there, some so rare that they had previously been found only at the original localities, mostly in Europe. Practically nothing was known about these rarities until they were rediscovered in the Argentine mine, and restudied by Mr. Gordon.

The new mineral was picked out of a mass of rare minerals by members of the department of mines and geology of Argentina. The pale yellow-orange nodules were unlike anything seen before in the mine and excited the interest of Dr. Angelelli, who believed they might be a new mineral. A sample was dispatched at once to the Academy, because of its high rank in the field of micro-mineralogy.

Mr. Gordon studied the nodules under a high power microscope, and could see that they were made up of exceedingly minute prisms, the largest of which were only a thousandth of an inch long. One of the largest, for the smallest were only a twelfth as large, he mounted on

the point of a pin, carefully orienting it under the microscope. It was transferred to a two-circle goniometer, a complicated instrument for determining the angles of minute crystals. Light signals could be seen as the various faces of the crystal were turned and the angles of the faces were measured. He was then able to draw a figure of the crystal and classify it as of the monoclinic system. Chemical analysis disclosed that it was a hydrous iron arsenate-sulfate.

The new mineral was named for Domingo Faustino Sarmiento, a great Argentinian educator and statesman, who was born in 1811 and died in 1888. Sarmiento held the offices of minister

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of public instruction and minister of the interior, and was made minister to the United States. While in his diplomatic post in Washington, he was made president of the Argentine Republic, in 1868. It was through him that American ideals in education were brought to the Argentine. He also founded the Cordoba Academy of Science, an important scientific institution in Argentina.

Science News Letter, October 11, 1941

ENGINEERING

Anti-Aircraft Gun Mount First Built By Industry

See Front Cover

THE FIRST 90 millimeter anti-aircraft gun mount to be built by private industry in the United States has been completed in the shops of the Allis-Chalmers Manufacturing Company. This gun can shoot an explosive shell nearly seven miles up into the air, which is higher than most bombers can fly. Workmen, putting the finishing touches on the gun mount just ten minutes before its presentation to the United States Army, are shown on the front cover of this week's Science News Letter.

Science News Letter, October 11, 1941

An 800,000-word handbook of Federal *Indian Law* has been prepared by the Government.

Books

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New Machines And Gadgets

Novel Things for Better Living

The back seat of a motor car is too narrow to stretch out on comfortably, even in the new extra wide models. But diagonally there is room and everything would be fine, if only there were something to rest your feet on. This need is now supplied by an invention recently patented. It is a sort of auxiliary seat on the order of a Morris chair, which rests on the original seat but fits snugly into the corner, and has a long footrest stretching diagonally across the rear compartment of the car.

The home mechanic who, in attempting to do some soldering, has often felt that he needed three hands, one to hold the soldering iron, another to hold the solder, and a third to hold the work—a job for a man and a half, too much for one, not enough for two—will welcome a solder feeding device that has recently been patented. It can be attached to any soldering iron, takes an ordinary spool of solder wire and guides the latter to the tip of the iron. A little push on a lever provides fresh solder as needed.

Air cooled by a spray of cold water is the method used in a simple air-conditioning device on which a patent has recently been granted. But what about the moisture that is thus added to the air? That matter has been taken care of by this device. The air after spraying passes into a rapidly revolving cylinder where the moisture-laden air is thrown outward to the walls of the cylinder and passes out through openings therein. Only the relatively dry air in the middle is drawn off for cooling.

This cow tail holder prevents the cow from swishing the milkmaid or man in the face. However, she can still kick the pail. The device, on which a patent has been granted, consists of a clip of soft resilient material (rubber to



you) in which a metal spring is buried, so that the tail can be clipped to a tendon of the cow's leg. Undoubtedly the milkman and the flies will be in favor of this arrangement, but we have yet to hear from the cow.

If curved windshields are ever applied to automobiles—and this would be very desirable because they would not flash the sunlight into other people's eyes—a difficult little problem would arise in the windshield wiper. However, this has already been solved by a recently patented wiper which is mechanically so arranged that the curvature of the wiper is modified, as it swings to and fro, in such a way as to follow that of the windshield.

Chemical icicles are used on many of Hollywood's movie sets. The icicles are made of cellophane and water glass—the substance used to preserve eggs. After being shaped they are dipped in alcohol, which solidifies them, and then in paraffin. The latter forms a coating which melts under the heat of the spotlights, giving a very realistic effect of icicles slowly melting.

A phonograph needle having a large, rounded sapphire tip has recently been granted a patent. It is said to reduce the needle scratch because it rides on the well-formed top of the record groove, never on the noisy bottom. For this reason, too, the life of the record is prolonged many times. It is especially adapted for use on phonograph-radio combinations, and will appear in the 1942 models of a well-known maker.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St. N. W., Washington, D. C., and ask for Gadget Bulletin 74.

A new liquid fuel is 60% coal and 40% oil, and produces a hotter fire than either coal or oil alone.

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ECONOMICS

Silk Piling Up in Japan Is Problem For Science

CUT OFF from her best silk customer, the United States, Japan is reported to be piling up silk at the rate of 700 to 800 bales a day—as if caught in some ironic fairytale bewitchment in which riches and luxury mount in unwanted profusion.

Quantities of silk turned back from Japan's ports are being relayed to the interior, according to word received here by commerce officials. It is believed that the Japanese silk industry faces serious disorganization, for in addition to loss of the United States silk trade, Europe as a customer is virtually cut off by the Soviet-Nazi conflict.

American women need not picture Japanese women as the glamor girls of this winter, the only ones who are close to plenty of silk for making sheer hose. Actually, an ordinance reported in August sternly told women of the leisure class in Japan that they did not need stockings at all, and that the rationing system would give preference to working women in buying any kind of hosiery.

Besides reducing cocoon production, Japanese officials and scientists are casting about for various remedies for the silk dilemma. Rise of rayon and nylon had already spelled warnings to Japan that the silk industry, which is a mainstay of about 2,000,000 farm families, would have to be completely reorganized. Using some cocoons for making a wool substitute is one Japanese textile idea. Japan needs wool, and the farmers are accustomed to raising silkworms. Likelihood that Japanese people will be permitted and encouraged to use more silk is also foreseen. As war economy, Japanese have been restricted to wearing poorer grade silk and mixed textiles, so that high grade silk might be sold abroad.

Science News Letter, October 11, 1941

PHYSIOLOGY

Sex Glands Found Linked With Brain's Growth

A LINK between the sex glands and the brain's growth and chemical composition has been found by Dr. Arthur Weil of the Institute of Neurology of Northwestern University Medical School.

Removal of the sex glands in a male rat causes a drop in the weight of the

brain as well as the body, as compared with unoperated animals. But in the female, whose brain is normally lighter than that of the male, removal of the sex glands causes an increase in weight of brain and body.

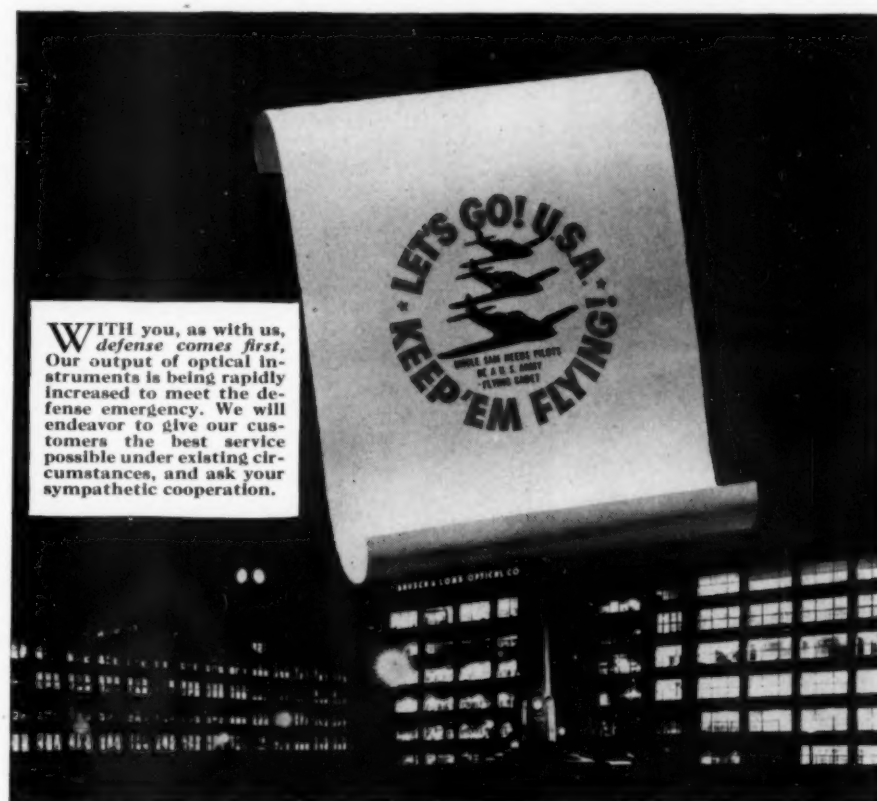
Deprivation of the sex glands does not completely eliminate the normal difference in brain weights between the male and female animals, Dr. Weil found. The still remaining disparity may be considered, he believes, as an expression of the determination of sex that

took place in the very first moments of the animals' existence and is determined by its inheritance of chromosomes.

The differences between the normal male and the operated male, or the normal female and the operated female, on the other hand represent the effect of the sex glands on the growth of the brain either directly or by the influence of the pituitary, thyroid or adrenal glands.

Details of Dr. Weil's study are contained in a current issue of the scientific journal, *Endocrinology*.

Science News Letter, October 11, 1941



THE challenge of the War Department finds one answer in the words of Edward Bausch when he says, "My associates and myself have obligated this company to a program that eclipses in magnitude and speed all previous efforts."

This pledge is underlined and italicized three times every twenty-four hours by the long lines of workers in each change of shift. Every resource and facility gained in filling the diverse optical needs of education, research and industry is being concentrated in maintaining an unbroken flow of optical instruments to America's front lines of defense and to America's defense industries.

Many are the Bausch & Lomb prod-

ucts that help to "keep 'em flying." There are bubble octants for aerial navigation; photo lenses for mapping and reconnaissance, height finders, searchlight mirrors and flank-spotting scopes for anti-aircraft defense; binoculars for spotters; Ray-Ban Glasses for fliers.

The accepted optical aids to industry developed by Bausch & Lomb—the Contour Measuring Projector, the Metallographic Equipment, the B&L Littrow Spectrograph—are now in the first line of production, doing important work in keeping them flying.

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•First Glances at New Books

GENERAL SCIENCE

SCIENCE CALLS TO YOUTH, A Guide to Career-Planning in the Sciences—Raymond F. Yates—*Appleton-Century*, 205 p., illus., \$2. An inspirational and factual presentation of what science means to youth, emphasizing the opportunities for making research and technical service a life work. The work of science clubs is emphasized, especially the pioneering of the American Institute, the national portion of which work Science Service is now sponsoring as Science Clubs of America.

Science News Letter, October 11, 1941

BIOLOGY

ADVENTURES WITH A MICROSCOPE—Richard Headstrom—*Stokes*, 232 p., illus., \$2. In 59 "Adventures," the reader is taken through a wide range of interesting territories that can be explored through a microscope equipped with a suitable battery of lenses, from simple examination of protozoa and diatoms to the investigation of circulatory and nervous systems in some of the metazoa.

Science News Letter, October 11, 1941

ANTHROPOLOGY

SCIENTIFIC ASPECTS OF THE RACE PROBLEM—H. S. Jennings, Charles A. Berger, Thomas Verner Moore and Ales Hrdlicka and others—*Longmans, Green*, 302 p., \$3. See page 236.

Science News Letter, October 11, 1941

GEOLOGY

OUTLINES OF PHYSICAL GEOLOGY, 2d ed.—Chester R. Longwell, Adolph Knopf and Richard F. Flint—*Wiley*, 381 p., illus., \$2.75. New edition of a successful text, with revisions necessitated by progress in the field during the seven years that have elapsed since its first appearance.

Science News Letter, October 11, 1941

GENETICS

GENETICS AND THE ORIGIN OF SPECIES (2d ed.)—Theodosius Dobzhansky—*Columbia Univ. Press*, 446 p., \$4.25. A book that attracted a great deal of attention when it first appeared four years ago now goes into its second edition. Even in four years there have been developments that call for very extensive revisions of the original text.

Science News Letter, October 11, 1941

PALEONTOLOGY

THE MAMMALIAN FAUNA OF THE WHITE RIVER OLIGOCENE, Part V: *Perisodactyla*—William Berryman Scott—*American Philosophical Society*, 233 p.,

100 pl., illus., \$3. (Transactions of the American Philosophical Society, New Series, Vol. XXVIII, June, 1941.) A new number in the very important series of monographs by Princeton's veteran paleontologist. This one is of particular interest because of the groups treated, notably the hyracodonts, brontotheres and equids.

Science News Letter, October 11, 1941

HERPETOLOGY

THE HERPETOLOGY OF HISPANIOLA—Doris M. Cochran—*Govt. Print. Off.*, 398 p., 12 pl. illus., 70c. (U. S. National Museum Bulletin 177.) A well-illustrated account of the batrachians and reptiles of one of the most interesting but least known islands of the Greater Antilles, intended primarily for professional zoologists.

Science News Letter, October 11, 1941

ICHTHYOLOGY

GUIDE TO THE FISHES OF THE GREAT LAKES AND TRIBUTARY WATERS—Carl L. Hubbs and Kari F. Lagler—*Cranbrook Institute of Science*, 100 p., pls., \$1 cloth, 50c. paper. A well-constructed analytical key to the fishes of an important section of the United States and Canada, that will be welcomed alike by students and fishermen.

Science News Letter, October 11, 1941

ORNITHOLOGY

BIRDS IN YOUR BACKYARD, Native Birds in Their Haunts with a Check List for Sangamon County—Virginia S. Eifert—*Illinois State Museum*, 238 p., illus., 60c. The birds of a typical Midwestern community, well described and superbly illustrated. Every other page is a full-page illustration, beautifully executed in black and white. This book will, of course, be useful far beyond the limited territorial range it sets for itself.

Science News Letter, October 11, 1941

ZOOLOGY

A MONOGRAPH OF THE EXISTING CRINOID: Vol. I, The Comatulids, Part 4a, Superfamily Mariametrida (except the family Colobometridae)—Austin Hobart Clark—*Govt. Print. Off.*, 603 p., 61 pl., \$1.50. (U. S. National Museum Bull. 82.) A notable addition to an already notable series of publications on a difficult and little understood group of animals. This monograph is of course strictly professional in its appeal; it is by a zoologist and for zoologists, but to its relatively limited audience it is indispensable.

Science News Letter, October 11, 1941

CHEMISTRY

OUT OF THE TEST TUBE (3d ed.)—Harry N. Holmes—*Emerson*, 305 p., illus., \$3. This new edition of one of the best of the popular discussions of chemistry contains much new material, including a chapter on "Strategic Raw Materials." The story of chemistry is told from the earliest beginnings of chemical knowledge down to the present time. The marvelous achievements of chemistry and their effects on human lives are related, and tales from the lives of famous chemists are generously sprinkled in.

Science News Letter, October 11, 1941

PHYSIOLOGY

THE BODY FUNCTIONS, Physiology—Ralph W. Gerard, *Wiley*, 289 p., illus., \$2.25. Although this is no simple A B C primer on physiology for the layman, Prof. Gerard's humor and clear breezy style make it easy for the reader to understand and enjoy the complicated but fascinating story of how the human body works.

Science News Letter, October 11, 1941

BACTERIOLOGY

PRINCIPLES OF MICROBIOLOGY—Francis E. Colien and Ethel J. Odegard—*Mosby*, 444 p., illus., \$3. A new text and reference book on bacteria and other microorganisms, giving special attention to the pathogenes. The many illustrations in color will be particularly helpful to the student.

Science News Letter, October 11, 1941

CHEMISTRY—HORTICULTURE

PLANT GROWTH-SUBSTANCES, Their Chemistry and Applications, With Special Reference to Synthetics (2d ed., rev.)—Hugh Nicol—*Chemical Pub. Co.*, 148 p., \$2. A good many new things that have happened in this rapidly expanding field since this book first appeared are given due notice in the revision.

Science News Letter, October 11, 1941

PHYSICS

A TEXTBOOK IN ELECTRICITY AND MAGNETISM—Harry C. Kelley—*Wiley*, 356 p., \$3.75. Designed to occupy a place between those treatises that are either too elementary or too advanced. This book nevertheless introduces the student to some of the most recent discoveries of physics and the most modern instruments of research, such as the mass spectrograph, the cyclotron and the electron microscope.

Science News Letter, October 11, 1941